IHE-DELFT WSE/HWR/06: Tracer Hydrology and Flow Systems Analysis

Exercise: Artificial tracers – NaCl experiment

A tracer test using 1 kg of NaCl was carried out on 16.02.2000 in the wastewater affected Wadi Modiin in the West Bank. A bucket was filled with 9 liters of wadi water, the salt was dissolved and injected at 10:00 h in the morning. Approximately 65 m downstream of the injection location the electrical conductivity was measured every 10 seconds.

Time [s]	El. Cond. [µS/cm]
0	540
10	540
20	540
30	540
40	540
50	540
60	540
70	540
80	540
90	540
100	540
110	540
120	540
130	540
140	540
150	540
160	540
170	540
180	540
190	540
200	540
210	530
220	540
230	540
240	540
250	540
260	540
270	550
280	560
290	570
300	590
310	620
320	650
330	670
340	690
350	710
360	720
370	730
380	730
390	730
400	720
410	710
420	700
430	690
440	680
450	670
460	660
470	650
480	650
490	640
500	630
510	620
520	620
530	620
540	610
550	600
560	600
570	600
580	590
590	590
600	590
610	580
620	580
630	580
640	570
650	570
660	570
670	570
680	570
690	560
700	560
710	560
720	560
730	560
740	560
750	550
760	550
770	550
780	550
790	550
800	550
810	550
820	550
830	550
840	550
850	550
860	550
870	540
880	540
890	540
900	540
910	540
920	540
930	540
940	540
950	540
960	540
970	540
980	540
990	540
1000	540
1010	540
1020	540
1030	540
1040	540
1050	540
1060	540
1070	540
1080	540
1090	540
1100	540

Two weeks later a calibration curve was prepared in the laboratory. To a starting volume of 500 ml wadi water in each step 5 ml of a 2 g/l NaCl-solution was added and the electrical conductivity was measured.

Added volume [ml]	El. Cond. [µS/cm]
0	541
5	577
10	613
15	648
20	682
25	715
30	747
35	779
40	810

1. Determine the calibration curve with its parameters of this experiment.

(type your answers here)

2. Determine the TBC of this experiment and display it graphically.

(type your answers here)

3. Determine the discharge Q [m^3/s] of the Wadi Modiin at 16.02.2000 and the recovery rate.

(type your answers here)

4. Determine the maximum and mean flow velocity [m/s].

(type your answers here)

5. Why can it be problematic to wait for two weeks until the calibration curve is determined?

(type your answers here)